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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/738,896	12/15/2000	Donald Brian Eidson	01827.0044.00US00	2188

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HOWREY SIMON ARNOLD & WHITE LLP
ATTEN: MARGARET P. DROSOS, DIRECTOR OF IP ADMIN
2941 FAIRVIEW PARK DR, BOX 7
FALLS CHURCH, VA 22042

EXAMINER	
CHANG, EDITH M	
ART UNIT	**PAPER NUMBER**
2637	7

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/738,896	EIDSON, DONALD BRIAN	
	Examiner	**Art Unit**	
	Edith M Chang	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 26 May 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-58 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-58 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed May 26 2004 have been fully considered, the rejection under 35 U.S.C. 112 has been withdrawn; the arguments regarding the rejections under 25 U.S.C. 103 are not persuasive, the rejections are upheld.

Argument: Pages 8-9: Applicant traverses each of these rejections because the proposed combinations of references fail to teach or suggest all of the features recited in independent claims 1, 29, 33 and 34. Specifically, claim 1 recites: "A system comprising: a symbol estimation module for determining, for *a multi-dimensional symbol r having a vector of complex-valued symbols* ...". In no instance does the combination of Lin and Morelos-Zaragoza teach or suggest the above-quoted features cited in the claims.

Response: Refer to the rationale of the rejection of claim 1 listed below. The combination of Lin and Morelos-Zaragoza teach/suggest the above-quoted features.

Argument: Page 9, Further more, Morelos-Zaragoza entirely fails to teach or suggest these features. The claimed multi-dimensional symbol includes a vector of complex-valued symbols. Therefore, a two-dimensional code would generate 1-dimesional [complex] symbols, and a 4-dimensional code would generate 2-dimensional [complex] symbols.

Response: Morelos-Zaragoza teaches the multi-dimensional symbol (column 2 lines 61-65 wherein the G is the code generator matrix) combined with the Lin's system to obtain the invention cited in the claims. The limitations (e.g. a two-dimensional code generates 1-dimensional [complex] symbols, and a 4-dimensional code generates 2-

dimensional [complex] symbols stated in the arguments) in the specification do not read in the claim when these limitations are *not recited in the claim* (see MPEP 2111).

The rejections are upheld as the following:

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-8, 12-18, 21, 23, 25-30, 32-41, 45-51, 53-54, and 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6493409) in view of Morelos-Zaragoza et al. (US 6101626).

Regarding **claims 1-2**, **4**, **33-35**, & **37**, except explicitly specify a multi-dimensional symbol vector, Lin et al. discloses a system and its methods, it comprises: a symbol estimation module/means (FIG.9) for determining an estimate of the *complex-valued symbol* (I/Q input of 76 FIG.7, column 12 lines 5-10 wherein the baud phase detector 76 coupled to receive *complex signals*); and a residual determination module/means couple to the symbol estimation module (24 FIG.9 is the residual determination module) for determining a residual or a function thereof for the symbol and the estimate. However Morelos-Zaragoza et al. teaches the multi-dimensional symbol having D dimensions, where D is an integer greater than 1 (FIG.2-4, column 2 line 61-column 3 line 15 wherein the code generator matrix G defined the code). As Lin et al. using the QAM receiver with the TCM decoding, at the time of the invention, it would

have been obvious to a person of ordinary skill in the art to have the multi-dimensional symbol in pre-Viterbi (Abstract '626) taught by Morelos-Zaragoza et al. expressed in Lin et al.'s receiver to have a more detail and complete illustration with complex-valued multi-dimensional symbol vector (FIG.9 input 50 '409), residual vector (FIG.9 input 124 MUX '409), estimation vector (FIG.9 output of 24 or output 24/32 FIG.1 '409), etc.

The suggestion/motivation for doing so would have been to provide a method for choosing the coding schemes, mappings, and puncturing rates allowing for faster and simpler decoding of a code (column 2 lines 24-30).

Therefore, it would have been obvious to combine Morelos-Zaragoza et al.' multi-dimensional teaching with Lin et al.'s receiver to obtain the invention as specified in the claims.

Regarding **claims 3 & 36**, Lin et al. discloses the symbol estimate comprising the scalar (FIG.1 output 24/32, FIG.9 output of 24)

Regarding **claims 5 & 38**, Lin et al. discloses the residual comprising the scalar (116-118 FIG.9, column 14 lines 12-20, the error is the residual).

Regarding **claims 6 & 39**, Lin et al. discloses the residual is a phase residual (FIG.9 120/60 is the phase detector).

Regarding **claims 7 & 40**, Lin et al. discloses the residual is an orthogonal component residual (FIG.9 117-118-116-124, column 14 lines 12-20 where the error is calculated, the error is the orthogonal component residual).

Regarding **claims 8 & 41**, Lin et al. discloses the residual is a composite residual (FIG.4, column 9 lines 36-44, column 12 lines 5-10, where the signal is represented as a

complex signal with I/Q as real/imaginary components. A composite residual is the imaginary component).

Regarding **claims 12**, **25-28**, & **45**, Lin et al. discloses a phase determination module for determining a derotation phase responsive to the residual (FIG.10 154, the output of 152 is the phase) in the carrier track module/loop of a receiver/communication device (FIG.4, Abstract) of a set-top box (column 1 lines 15-20).

Regarding **claims 13**, **16**, **46**, & **49**, Lin et al. does not explicitly specify the phase vector/ phase offset estimate vector being multi-dimensional, however Morelos-Zaragoza et al. teaches the multi-dimensional symbol having D dimensions, where D is an integer greater than 1 (FIG.2, column 3 lines 15). As Lin et al. using the QAM receiver with the TCM decoding and the phase detector, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the multi-dimensional symbol taught by Morelos-Zaragoza et al. expressed in Lin et al.'s receiver to have a more detail and complete illustration with the phase vector (FIG.10 output 152 is the phase) and phase offset estimate vector (FIG.10 output 148 is the phase offset/error, column 15 lines 33-35). The combined/modified system has D dimension complex-valued symbol vector (FIG.9 input 50 '409), residual vector (FIG.9 input 124 MUX '409), estimation vector (FIG.9 output of 24 or output 24/32 FIG.1 '409), etc.

The suggestion/motivation for doing so would have been to provide a method for choosing the coding schemes, mappings, and puncturing rates allowing for faster and simpler decoding of a code (column 2 lines 24-30).

Therefore, it would have been obvious to combine Morelos-Zaragoza et al.' multi-dimensional teaching with Lin et al.'s receiver to obtain the invention as specified in the claims.

Regarding **claims 14 & 47**, Lin et al. discloses the derotation phase is the scalar (FIG.10 154).

Regarding **claims 15**, **17**, **25-28**, **48**, & **50**, Lin et al. discloses a phase determination module for determining a phase offset estimate (FIG.10 is the phase determination module, FIG.10 output of 148 is the phase offset/error represented as a scalar, column 15 lines 33-35) responsive to the residual (FIG.9 24/60 is the phase determination module) in a carrier tracking module of a receiver/communications device/set-top box (FIG.4 is the carrier tracking module, Abstract).

Regarding **claims 18 & 51**, Lin et al. does not explicitly specify the symbol vector for the symbol derotator (FIG.10 154 is the symbol rotator) being multi-dimensonal. for derotating each of the symbol responsive to the derotation phase, however Morelos-Zaragoza et al. teaches the multi-dimensional symbol having D dimensions, where D is an integer greater than 1 (FIG.2, column 3 lines 15). As Lin et al. using the QAM receiver with the TCM decoding and the phase detector, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the multi-dimensional symbol taught by Morelos-Zaragoza et al. expressed in Lin et al.'s receiver. The combined/modified system has a more detail and complete illustration with D dimension complex-valued symbol vector (FIG.9 input 50 '409) to 154 De-Rotator for derotating each of the symbol responsive to the derotation phase.

The suggestion/motivation for doing so would have been to provide a method for choosing the coding schemes, mappings, and puncturing rates allowing for faster and simpler decoding of a code (column 2 lines 24-30).

Therefore, it would have been obvious to combine Morelos-Zaragoza et al.' multi-dimensional teaching with Lin et al.'s receiver to obtain the invention as specified in the claims.

Regarding **claim 21**, Lin et al. discloses a decoder capable of producing soft estimates (FIG.1 32 is the decoder, column 7 lines 10-16).

Regarding **claims 23 & 54**, Lin et al. discloses the phase determination module updates the derotation phase at the frequency of individual symbol (FIG.10, column 9 lines 30-36 where the updating at the frequency of individual symbol).

Regarding **claims 29-30**, except explicitly specify a multi-dimensional symbol vector, Lin et al. discloses a system comprising: a symbol estimation module/means (FIG.9) for determining an estimate of the symbol; and a residual determination module/means couple to the symbol estimation module (24 FIG.9 is the residual determination module) for determining a residual or a function thereof for the symbol and the estimate; a phase determination module for determining a derotation phase of phase offset estimate (FIG.4 60, FIG.10). However Morelos-Zaragoza et al. teaches the multi-dimensional symbol having D dimensions, where D is an integer greater than 1 (FIG.2, column 3 lines 15). As Lin et al. using the QAM receiver with the TCM decoding, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the multi-dimensional symbol taught by Morelos-Zaragoza et al. expressed in Lin et al.'s receiver. The combined/modified system has a more detail and complete

illustration with complex-valued D dimensional symbol vector (FIG.9 input 50 '409), residual vector (FIG.9 input 124 MUX '409), estimation vector (FIG.9 output of 24 or output 24/32 FIG.1 '409), derotation phase vector (FIG.10 out put of 152), etc.

The suggestion/motivation for doing so would have been to provide a method for choosing the coding schemes, mappings, and puncturing rates allowing for faster and simpler decoding of a code (column 2 lines 24-30).

Therefore, it would have been obvious to combine Morelos-Zaragoza et al.' multi-dimensional teaching with Lin et al.'s receiver to obtain the invention as specified in the claims.

Regarding **claims 32 & 53**, Lin et al. discloses a symbol derotator for derotating each of the individual symbols responsive to the derotation phase (FIG.10 154).

Regarding **claims 56-58**, Lin et al. discloses a computer readable medium comprising a memory (column 7 lines 25-35, where the microprocessor is the computer readable medium comprising a memory)/circuitry (FIG.1 is the circuitry) embodying any of the methods of claims 34-55.

4. Claims 9-11, and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6493409) in view of Morelos-Zaragoza et al. (US 6101626) as applied to claims 1 and 34, and further in view of Rhodes (US 4466108).

Regarding **claims 9-10**, & **42-43**, further Rhodes teaches the residual determination module determining a function which is the average of the individual components of the residual (FIG.1 55, FIG.2 110, where the 110 is the average function of the residual determination module FIG1.55). As Lin et al. using the phase as the

residual/correction term, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the average function taught by Rhodes in Lin et al.'s phase detector to have the carrier phase synchronization and provide the correct symbol synchronization (column 2 lines 27-30).

Regarding **claims 11** & **44**, further Rhodes teaches a reliability metric weighting the residual or function (column 6 lines 35-40, the weighting performs in the AVERAGE of the PHASE ESTIMATOR FIG.1 & 2). As Lin et al. using the phase as the residual/correction term, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the weighting taught by Rhodes in Lin et al.'s phase detector to obtain optimum estimation.

5. Claims 19-20, 24 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6493409) in view of Morelos-Zaragoza et al. (US 6101626) as applied to claims 15 and 45, and further in view of Zehavi et al. (US 5691974).

Regarding **claim 19**, further Zehavi et al. teaches an accumulator for derotating the individual symbol responsive to the derotation phase (FIG.5 178, column 19 lines 13-18). As Lin et al. using the phase detector/phase derotator, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the accumulator taught by Zehavi et al. in Lin et al.'s phase detector to temporarily store symbol over a time interval to provide improved time and phase tracking (column 4 lines 20-25).

Regarding **claims 20**, **24**, & **55**, Lin et al. does not explicitly specify the multidimensional symbol vector for the symbol derotator (FIG.10 154 is the symbol

rotator) for derotating each of the symbol responsive to the derotation phase, however Morelos-Zaragoza et al. teaches the multi-dimensional symbol having D dimensions, where D is an integer greater than 1 (FIG.2, column 3 lines 15). As Lin et al. using the QAM receiver with the TCM decoding and the phase detector, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the multi-dimensional symbol taught by Morelos-Zaragoza et al. expressed in Lin et al.'s receiver. The combined/modified system has a more detail and complete illustration with complex-valued D dimensional symbol vector (FIG.9 input 50 '409), residual vector (FIG.9 input 124 MUX '409), estimation vector (FIG.9 output of 24 or output 24/32 FIG.1 '409), derotation phase vector (FIG.10 out put of 152) for updating once for each symbol to obtain the invention specified in the claims, and to provide a high speed decoder for a multi-dimensional symbol implemented with efficient circuits (column 1 line 65-column 2 line 15).

6. Claims 22, 31, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 6493409) in view of Morelos-Zaragoza et al. (US 6101626) as applied to claims 21, 29 and 48, and further in view of Viterbi et al. (US 5933462).

Regarding **claims 22, 31 & 52**, further Viterbi et al. teaches the log-MAP decoder (FIG.3 20, column 5 lines 3-7). As Lin et al. using the decoding in the receiver, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the log-MAP decoder taught by Viterbi et al. in Lin et al.'s decoder to provide a better performance decoder while avoiding the excessive hardware requirement (Abstract, column 5 lines 3-7).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Chang whose telephone number is 703-305-3416. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayanti Patel can be reached on 703-308-7728. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Edith Chang
July 30, 2004

Young Tse

YOUNG T. TSE
PRIMARY EXAMINER